BIM in New Zealand — an industry-wide view 2017

Baseline information on the use of BIM across the New Zealand construction industry

EBOSS

BIM ACCELERATION COMMITTEE

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

BRANZ Funded from the Building Research Levy

Contents

BIM benchmark survey foreword

This is the fourth survey in a five-year series that follow progress being made in accelerating the introduction of BIM into New Zealand.

This five-year series follows an industry control group (industry) of large and influential organisations in New Zealand's built environment, allowing developments in BIM's introduction to be monitored.

For the second year we have also carried out the client survey (client) which focusses on asset owners and managers in order to better understand what progress BIM is having in facilities and asset management.

Additionally, this year, we have carried out a wider survey of industry participants, the survey population arising from those who participated in the "BIM 101" or BRE training in the past couple of years. This was undertaken to test whether BIM uptake in New Zealand was different among smaller organisations than those comprising the industry control group; and, if this was the case, did this wider cohort perceive different barriers to BIM adoption. This research is reported on www.BIMinNZ.co.nz.

Once again the BIM Acceleration Committee (BAC) considers itself fortunate to have the continuing support of MBIE, BRANZ and a number of large private sector organisations as it enters its second three-year term in its effort to accelerate BIM's introduction into New Zealand. Our sincerest thanks go to our partner, EBOSS, for its investment in managing and sponsoring these surveys; and to those organisations forming the industry, client and wider survey groups. These surveys are critical in allowing a very complete view to be formed of the progress being made in BIM's introduction and identification of barriers to its implementation.

Finally, should any reader of this report have any suggestions for improvement, please don't hesitate to e-mail BIMinNZ at info@biminnz.co.nz, or raise the issue at one of the regular BIM network meetings now taking place in Auckland, Wellington and Christchurch (see www.biminnz.co.nz for more details).

Kind Regards

Andrew Reding

ANDREW REDING

Chair, BIM Acceleration Committee

Formed in 2006, EBOSS hosts a comprehensive architectural product library, with an active audience of 35,000 architects, designers, main contractors and tradespersons. At EBOSS we are interested in improving the communication of BIM information through the construction value chain and appreciate the opportunity to partner with the BIM Acceleration Committee and sponsor this research initiative.

EBOSS

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Executive summary

In September 2017 EBOSS reran the BIM industry control group survey (industry); the fourth year of a five-year programme. In conjunction with this we completed the second year of a survey focussed on clients, made up of property/asset managers from organisations with large property / constructed assets portfolios (clients).

Among industry responses there is a general sense of maturation in the use of BIM. Growth has slowed or plateaued in the number and proportion of projects using BIM and in many specific BIM uses. Among this group, the proportion of projects using BIM is only slightly up from 2016 (55%) at 57% of projects in 2017.

In addition, open-ended comments suggest that industry have moved past the initial learning stage and now realise how complicated BIM and BIM models can get. There is a realisation that this complexity has consequences including the cost of changes, the issues of combining BIM models from different parties, and the large amount of work involved in making changes and providing what clients need for later operation of construction/constructed assets.

Clients use of BIM is much less. In total, 38% of clients aware of BIM are using BIM-based systems. Use appears to be site-specific; amongst those with BIM-based systems, they are being used on only 7% of sites. Both of these are lower than reported use in 2016. This may be due to changes in sample structure and lower response rates than actual changes in the use of BIM.

The major roadblock to increased use of BIM appears to be using it for asset and facilities management (the operate phase of a building). Among industry the predicted increase in use of BIM for asset and facilities management over the last two years has not eventuated. As mentioned, 38% of the clients aware of BIM are currently using BIM, and only on 7% of projects. This may be the result of legacy systems being used.

Looking at the comments from both industry and clients, there is a sense of mismatched expectations. Industry talk about clients having unrealistic expectations about what BIM is able to do and what it involves (and costs). Similarly, clients mention the inability of preferred suppliers to deliver BIM to expectations. There may be benefit in bringing industry and client expectations closer together. In particular, ensuring that BIM is considered at the procurement level and costed for up-front may help. This may reflect that many of BIM's benefits accrue to the construction and operation phases of a project, but many of its costs arise in the project's design phase.

Ensuring BIM is considered at the project procurement stage and costed for up-front may help align industry and client expectations.

Who are in the industry group?

The industry group is a sample of 46 businesses or individuals who have been identified as key users of BIM within the building and construction industry. These businesses completed the same survey on BIM use in 2014, 2015, 2016, and 2017. 40 of the original 46 organisations completed the survey in 2017: a response rate of 87%.

The 2017 survey allows us to compare to the 2014 through to 2016 data to see how BIM use and acceptance has changed among industry in the last four years.

The industry survey was sponsored and managed by EBOSS on behalf of the BIM Acceleration Committee. It was analysed by an external researcher[1].

The maximum margin of error for the industry survey is +/-15% at the 95% confidence interval.

A little about the industry group:

	2014	2015	2016	2017
Where their businesses are based				
Auckland	23	28	31	27
Bay of Plenty	1	1	1	1
Wellington	5	2	4	2
Canterbury	6	5	7	5
Otago/Southland	1	-	-	1
Other	3	1	-	-
Unspecified	7	3	-	4
The size of these businesses				
Conglomerate (30+ employees)	26	24	29	26
Large (10-30 employees)	8	10	10	8
Medium (5-9 employees)	4	-	1	-
Small (2-4 employees)	1	2	1	2
Unspecified	7	4	2	4
Profession of respondents				
Design/engineer	13	12	14	14
BIM Professional	9	13	11	8
Project Manager	4	2	2	2
Quantity Surveyor	3	4	3	4
Construction	5	3	5	3
Other (incl. Government, model creation, etc.)	4	6	4	3
Unspecified	8	-	4	6
Total	**46**	**40**	**43**	**40**

[1]The researcher is a member of the NZ Research Association, ESOMAR, and Australian Market Research Society, bound by strict codes of research ethics and requirements

Who are in the client group?

In 2016 we initiated the first in a planned series of surveys of property/asset managers of organisations with medium to large portfolios of property or other constructed assets, focusing on their use and understanding of BIM. A total of 44 organisations agreed to participate in the survey. In 2017, 26 client organisations responded to the survey: a response rate of 59%. This survey will be repeated again in 2018 alongside the industry survey.

Note to reading client data: Due to the reduction in sample size and differences in role of respondents from 2016, some difference in 2017 data may be driven by sample changes.

The client survey was funded by BRANZ and managed by EBOSS on behalf of the BIM Acceleration Committee. It was analysed by an external researcher[2].

The maximum margin of error for the client survey is +/-19% at the 95% confidence interval.

67% of clients identify using as-built BIM models for facility planning and reuse as a benefit of BIM.

A little about the client group:

Number of sites in their portfolio			
	Actual 2016	Actual 2017	Projected 2018
1-20 sites	7	8	6
21-50 sites	6	2	3
51-100 sites	6	3	2
More than 100	6	7	7
Unspecified	8	6	8

Industry	2016	2017
Local Government	7	3
Central Government	5	3
Property management	4	3
Property development	3	1
Infrastructure management	2	1
Maintenance	2	1
Utilities provider	2	1
Healthcare	1	3
Other	5	6
Not specified	2	4
Total	**33**	**26**

Role of respondents	2016	2017
Asset management	12	8
Portfolio management	3	-
Project management	3	3
Data management	2	-
Facilities management	2	4
Property management	2	1
Other	7	5
Not specified	2	5
Total	**33**	**26**

[2]The researcher is a member of the NZ Research Association, ESOMAR, and Australian Market Research Society, bound by strict codes of research ethics and requirements

Is BIM currently being used?

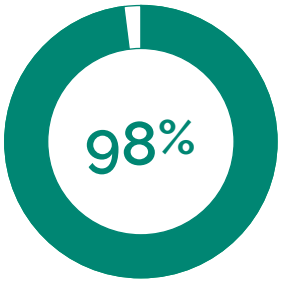
Use of BIM – industry and client groups

Both industry and clients were asked about their current use of BIM. All but one in industry have used BIM in the last 12 months. Of the clients, 38% have used BIM for at least some sites. This is down from 50% in 2016, but this may be due to sample differences.

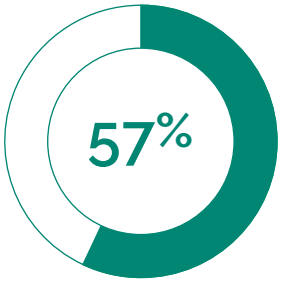
Within the industry group over half of all projects (57%) use BIM in some way. Among clients using BIM; on average 7% of sites have used BIM in some way. Among clients who are aware of BIM, 17% of are not currently using BIM but are looking at using BIM on some sites in the next 12 months.

Use of BIM among industry and clients

Industry group



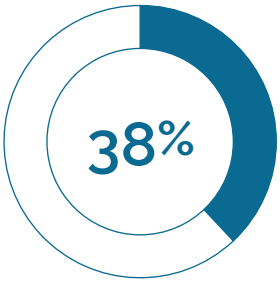
Used BIM in the last 12 months



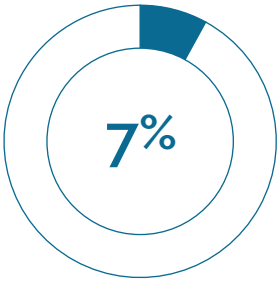
of all projects use BIM

intend to use BIM in the next 12 months

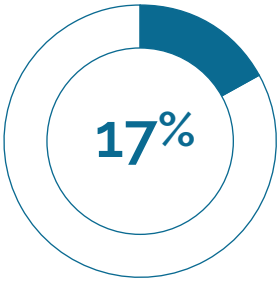
Client group



Aware of BIM and use BIM-based systems now for at least some sites*



The proportion of sites using a BIM-based system**



Are not using BIM and plan to start using BIM in the next 12 months*

Base: 2017 only industry group n=40, client group n=26
*Among those aware of BIM (92% of clients surveyed)
**Among those using BIM

BIM use in the workflow – industry

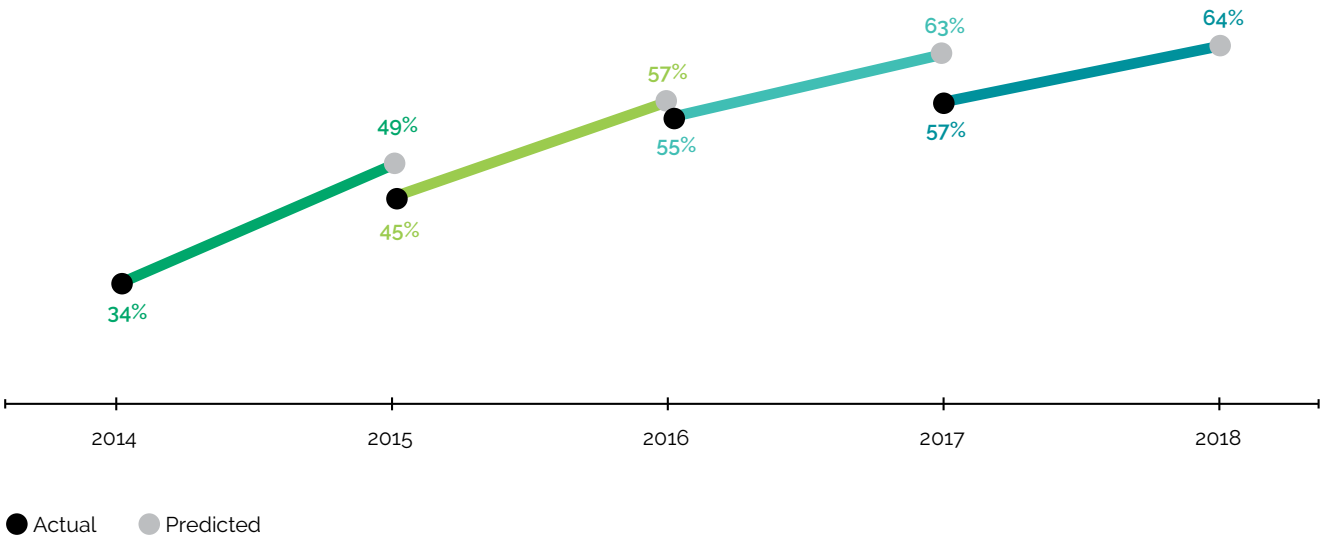
Increasing BIM use is about two things – firstly increasing the number of businesses that use BIM in their projects, and secondly increasing the proportion of projects that use BIM in each business.

We asked industry to estimate the proportion of their projects that:

a) have used BIM in the last 12 months; and
b) will use BIM in the next 12 months.

This gives us the proportion of projects using BIM (actual) in 2014 to 2017, and predicted in 2018. The overall proportion of projects which use some form of BIM has remained stable from 2016 to 2017. Industry anticipates an increase in the proportion of projects using BIM in 2018 – rising to 64% of projects on average.

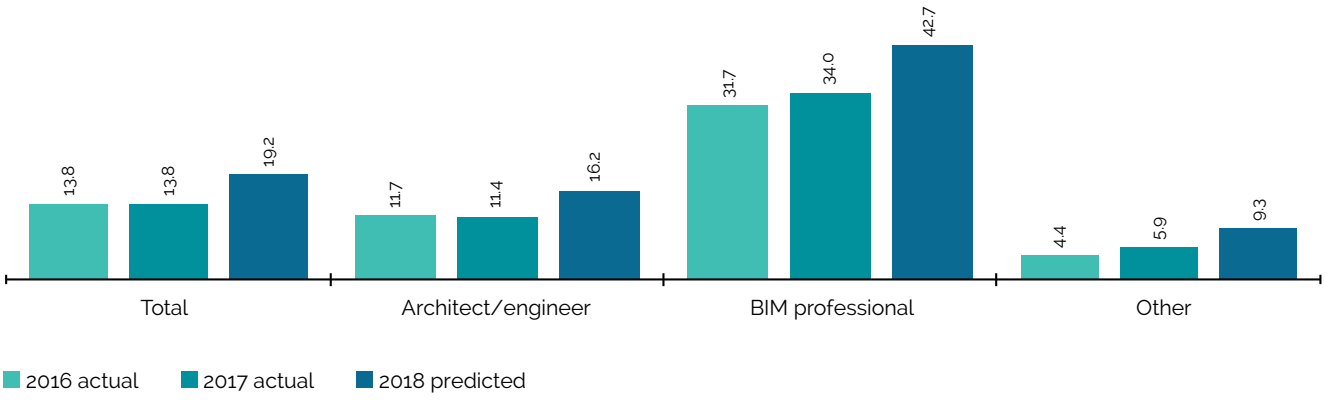
Percentage of projects using BIM (Actual vs forecast)



Base: 2014 n=46, 2015 n=40, 2016 n=43, 2017 n=40

The average number of projects using a BIM execution plan currently sits at 13.8 projects. This is consistent with the number of projects using a BIM execution plan in 2016.

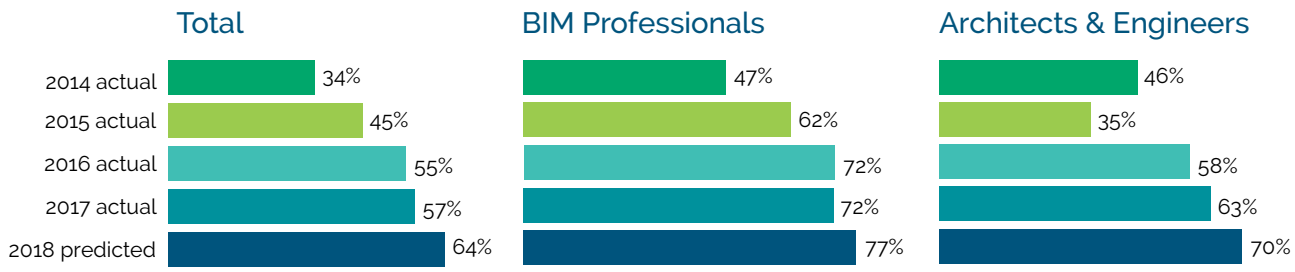
Average number of projects using a BIM execution plan (industry group)



Base: Total 2016 n=43, 2017 n=40. BIM professionals 2016 n=11, 2017 n=8. Architects and engineers 2016 n=14, 2017 n=14. Other 2016 n=18, 2017 n=18

As shown in the chart below, the proportion of projects within each company that use BIM has increased by 23 percentage points from 2014 to 2017, and in 2017 almost three in five (57%) projects used BIM.

Proportion of industry projects that use BIM



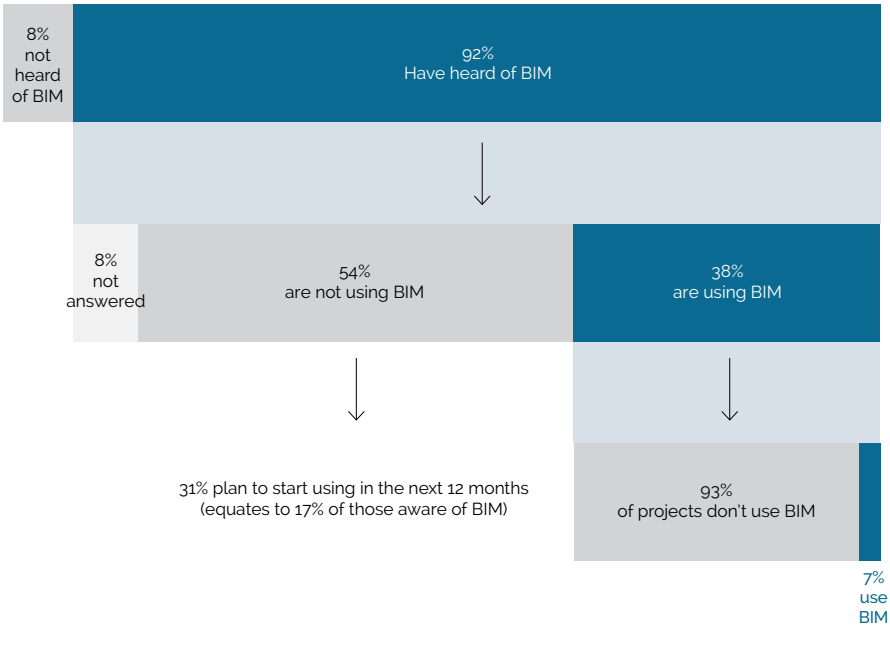
Base: Total 2014 n=46, total 2015 n=40, 2016 n=43, 2017 n=40. BIM professionals 2014 n=9, 2015 n=13, 2016 n=11, 2017 n=8. Architects and engineers 2014 n=13, 2015 n=12, 2016 n=14, 2017 n=14.

In the initial 2014 survey the firms with 30 or fewer employees were leading the way with 41% of projects using BIM. Conglomerates used BIM on 34% of projects. By 2017 the gap has closed, with firms with 30 or fewer employees using BIM in 57% of projects, compared to 59% of projects for conglomerates.

Awareness and acceptance of BIM by clients

Clients were asked whether they were aware of BIM and BIM based facility and asset management. Those who were aware of BIM were then asked whether they use BIM-based systems, and how many sites out of their total portfolio used a BIM based system. There continues to be a wide awareness of BIM (92%). In 2017, only 38% of clients aware of BIM are using BIM-based systems, down from 46% a year earlier. This drop may be due to sample differences from 2016 to 2017. The proportion of sites using BIM has remained stable at 7%.

Client awareness and use of BIM



Base: All clients surveyed n=26

Q. Have you heard of Building Information Modelling (BIM) and BIM based facility and asset management systems?

Base: All who have heard of BIM n=24

Q. Do you use BIM based systems?

Left Base: All who don't use BIM n=13

Q. Which of the following best describes your organisation's view on using BIM based systems for facility and asset management?

Right Base: All who use BIM n=9;

Q. How many of your sites use BIM based systems for asset and facility management?

Clients who are aware of BIM, but not currently using it, were asked to summarise their organisation's view on using BIM-based systems for facility and asset management. Just under one third (31%) are planning to start using BIM in the next 12 months. This is similar to 2016 rate (33%). This may indicate the intention has not yet translated into action. In 2017 62% of clients are considering BIM for the future (beyond 12 months).

The most notable change in the past 12 months is that all of clients have now considered using BIM (7% had not considered it in 2016).

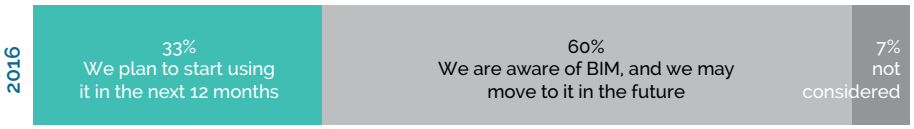
Less than one in ten (8%) say that they've considered using BIM but are unlikely to change. The main reason for not using, or considering a shift to, BIM is that the current systems are serving them well, or that they're not in a position to change from current practices. Some clients commented further:

> "Current SAP enterprise asset management systems meet need but we will be transitioning to BIM in the future. However, BIM will be a complementary system until capability across the organisation and technologies costs are more affordable. Our organisation runs on SAP systems at present."

> "Whilst currently widely used in the design and construction phase we are not seeing any real evidence in the FM area. We can see the potential but believe there is a lack of engagement to date and examples are not providing the full value of BIM in the FM space."

Understanding clients who don't use BIM

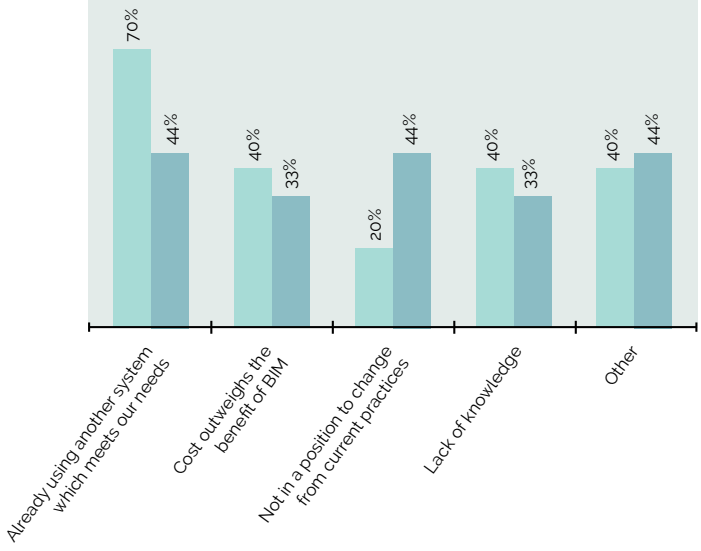
Disposition towards BIM among those not using now



Base: Client not using BIM now 2016 n=15, 2017 n=13

Q. Which of the following best describes your organisation's view on using BIM based systems for facility and asset management?

Reasons for not using/considering BIM



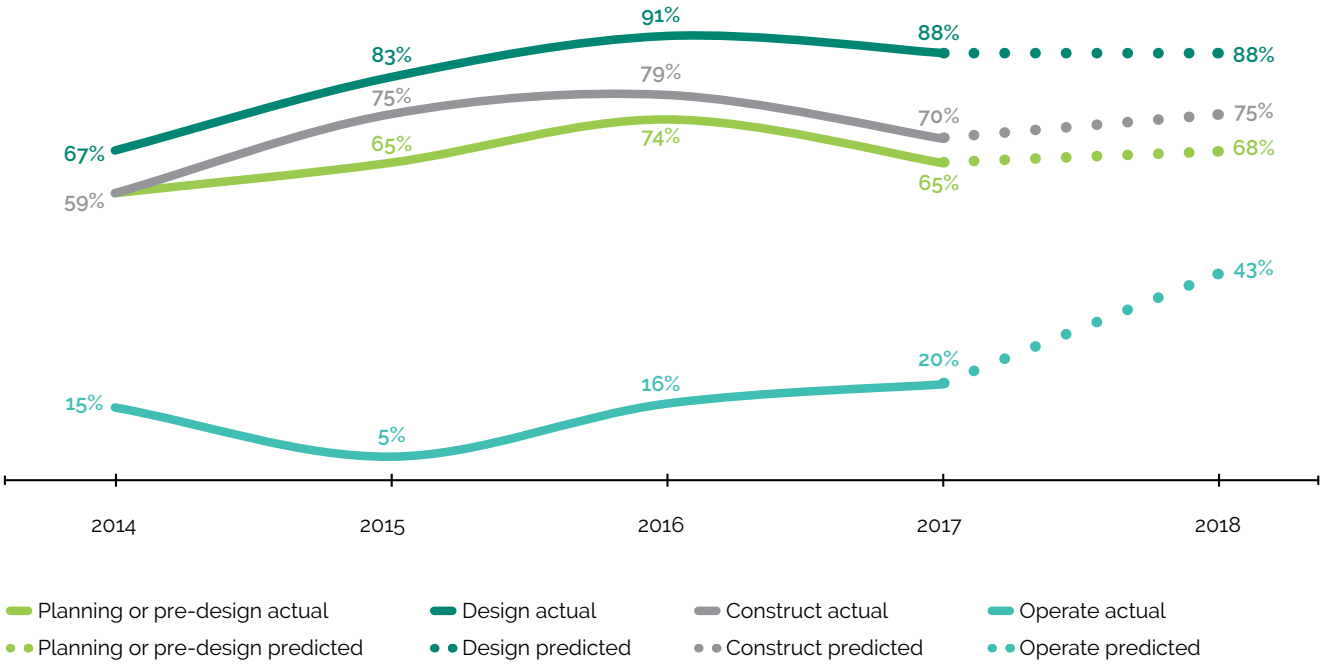
Base: Client not using BIM now, not planning to use in next 12 months 2016 n=10, 2017 n=9

Q. What are the main reasons you have not considered or moved to a BIM based system?

What is industry using BIM for?

Industry were asked where in the project lifecycle they had used BIM in the last 12 months, or planned to use BIM in the next 12 months. Almost nine in ten industry respondents use BIM at the design phase, while over two-thirds use BIM at the planning and construct phase. In 2017 actual use of BIM for asset and facilities management (the operate phase) has increased to 20% from 16% in 2016.

Industry BIM use across project lifecycle



Base: All respondents 2014 n=46; 2015 n=40, 2016 n=43, 2017 N=40
Q. For which project life cycle stages has/will BIM be used? Please select all that apply.

The declines in actual use from 2016 to 2017 are largely driven by project managers, quantity surveyors, construction, and other professions. Architect, engineer, or BIM professional use has remained similar to last year.

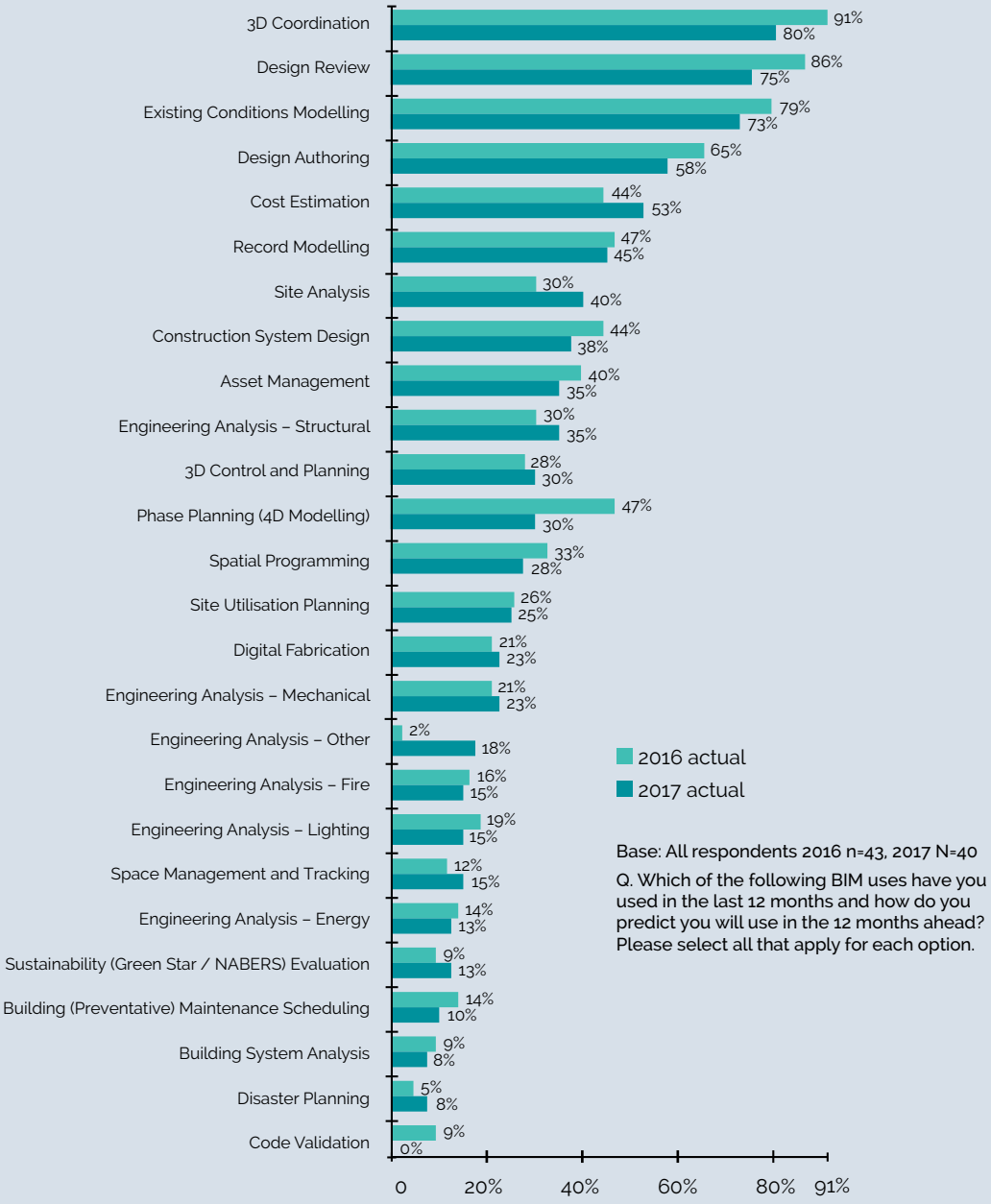
The low level of use in asset and facilities management may be partially driven by the sample structure of the control group: i.e. largely consultants. However, open-ended comments (for other questions in the survey) from industry hint at a lack of client use. This is also consistent with the level of use reported in the client survey.

Industry BIM uses in detail

There are BIM uses that have increased strongly between 2016 and 2017. Cost estimation, site analysis, and structural and other engineering analysis have all increased in use from 2016. A number of uses have declined from 2016: 3D coordination, design review, existing conditions modelling, design authoring, construction system design, asset management, phase planning, and spatial programming. These uses are all higher than the initial survey in 2014.

The data hints at a plateau in growth of BIM uses. Considering the data around use in facilities and asset management (and client survey responses), further growth may be hindered by the mismatch between client wants and industry's expectation of use.

Industry's BIM uses (actual only) 2016-2017



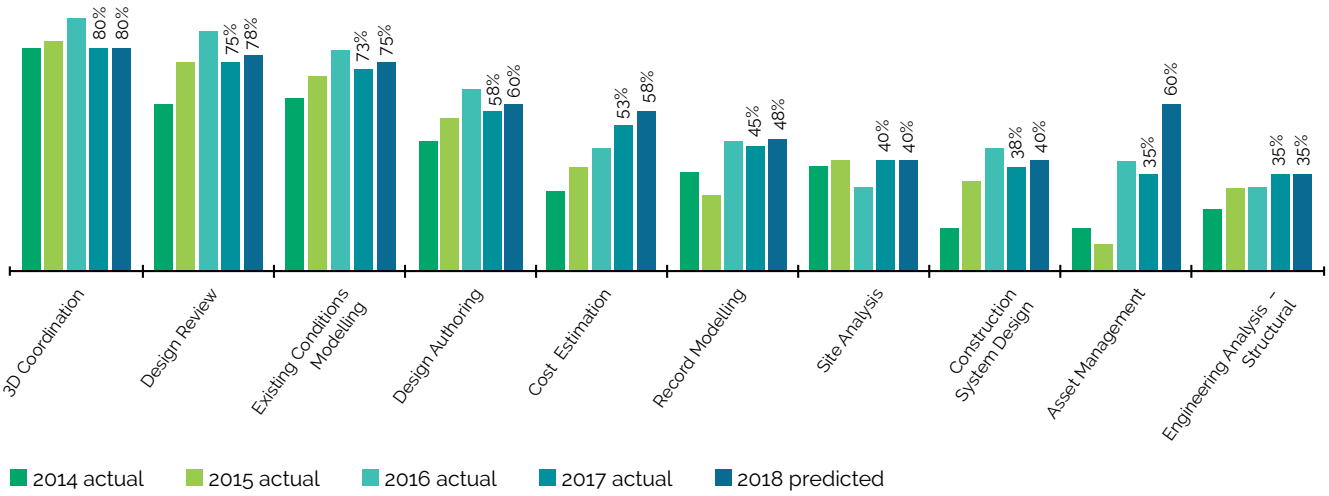
Base: All respondents 2016 n=43, 2017 N=40

Q. Which of the following BIM uses have you used in the last 12 months and how do you predict you will use in the 12 months ahead? Please select all that apply for each option.

Industry's most popular BIM uses

The top ten industry BIM uses remain largely similar to those in 2015. Site analysis has returned (after departing in 2016), and engineering analysis (structural) has reached the top ten this year. These have replaced phase planning (4D modelling) and spatial programming. The top use of BIM is still 3D co-ordination, followed closely by design review and existing conditions modelling.

Industry's top ten BIM uses



Base: All respondents 2014 n=46; 2015 n=40; 2016 n=43; 2017 n=40

Q. Which of the following BIM uses have you used in the last 12 months and how do you predict you will use in the 12 months ahead? Please select all that apply for each option.

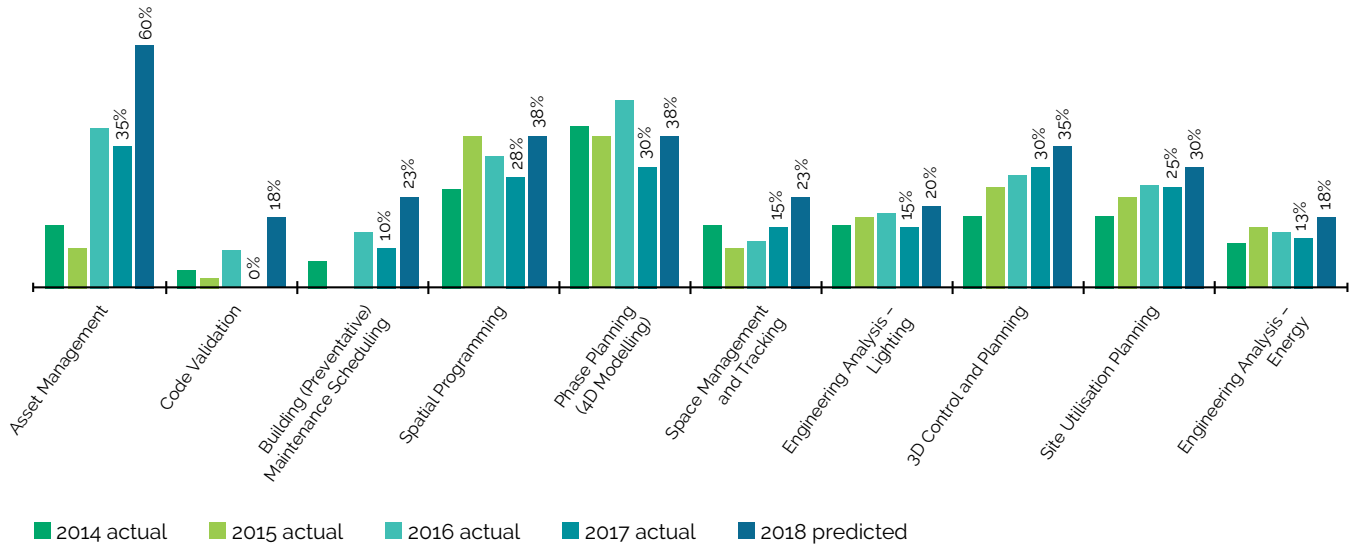
BIM uses most likely to grow in industry

There continues to be a high degree of optimism that various uses of BIM will increase in 2018. No uses are predicted to decline and only 5 out of the 26 uses are predicted to remain stable.

Asset management is predicted to grow substantially to more than 60% of all projects. Very similar predictions were made in 2016 but was not realised. The client survey shows that of those using BIM for asset or facility management, they are using it on only 7% of sites, and that 17% of clients who are aware of BIM but don't currently use BIM plan to start doing so in the next year.

This suggests there are barriers to increasing the use of asset management that are beyond the influence of industry. Industry remains far more optimistic about BIM use for asset and facilities management than previous practice and the client survey would suggest.

BIM uses most likely to grow in industry



Base: All respondents 2014 n=46; 2015 n=40, 2016 n=43, 2017 n=40

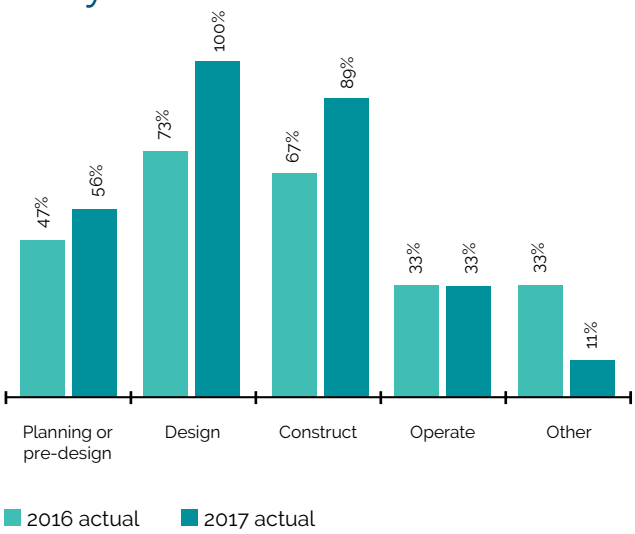
Q. Which of the following BIM uses have you used in the last 12 months and how do you predict you will use in the 12 months ahead? Please select all that apply for each option.

What are clients using BIM for?

The client survey group were asked when they use BIM. Among clients, design and construct stages continue to be the strongest areas for BIM use. All clients using BIM, are using it for design. Along with planning phase, these three stages have shown an increase in the proportion using BIM when compared to 2016. Asset and facilities management (operate) use is still relatively low.

33% of clients who are using BIM and responsible for asset and facility management are using the technology within the operate stage. This is consistent with the 2016 survey.

Client BIM use across project life cycle



Base: Clients using BIM now 2016 n=15, 2017 n=9

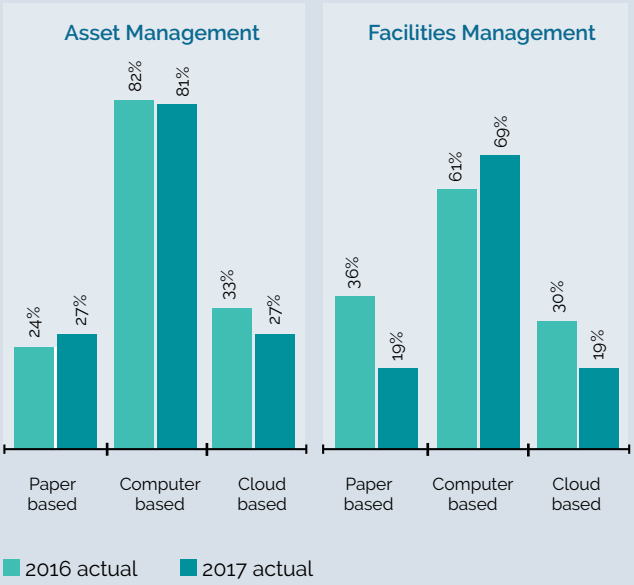
Q. At what stage are you currently using BIM for?

Clients' asset management

Clients were asked what types of systems they use for facilities management and asset management (paper, computer, or cloud-based), and whether these were used for reactive and/or planned maintenance. The majority of clients use computer-based systems for both asset and facility management. Use of computer-based systems for facility management has increased slightly since 2016, however, this may be due to sample differences. The majority of clients (85%) are using asset and facility management systems for both reactive and planned maintenance. 12% are using systems for reactive maintenance only. 4% are using systems for planned maintenance only.

Those clients who use computer or cloud-based systems were asked which ones they use. Many businesses are using a blend of systems selected to suit their specific needs (rather than relying on just one or two). However, the key systems that many were using include SAP, RAMM, SPM, and BEIMS.

Systems used by clients for asset and facility management



Note: Clients can use more than one type of system (and could be using all three)

Base: All clients surveyed n=26

Q. What kinds of tools or systems do you use for asset and facility management?

The benefits in increased use of BIM to the industry

Comments from industry around the benefits of BIM have remained consistent from 2016 to 2017. The major benefits are

- increased co-ordination between parties,
- better accuracy and understanding within complex designs, and
- improved efficiency.

BIM use allows for better co-ordination between parties (both internal teams and external contractors and trades) (38% of respondents mention this):

"Plan well, reduce rework and waste. Better communication and collaboration environment."

"Design co-ordination has improved and being able to demonstrate spatial areas is beneficial for decision making."

"Cost savings due to clash detection and services co-ordination."

"Better coordination, positive client engagement in project."

"We are now handing over more information to our Service Department to help in maintenance activities."

Better understanding of complicated design (20% of respondents mention this):

"BIM is a great way to quickly get a feel for what's involved in a job, and to pass onto others how a building is pieced together."

"We are ending up with a much-improved set of documentation for the purposes of Construction."

"Collection of data into a manageable digital model has given the business a better understanding of our built assets."

"Better understanding of building form and measuring quantities or pulling from models that would have been impossible on 2D format without exploded elevation plans."

Improved efficiency – from take-off through to construction (15% of respondents mention this):

"When done properly and efficiently it works really well and limits the issues on site. Typically, we would have 1000's of RFI's on the jobs we work on (due to magnitude), but recently we had a job that had just under 200 RFI's – including all the shop drawing reviews. This was due to several aspects being done right – including managing other's expectations and delivering a robust BIM that could be relied upon."

"We have been able to take consultants to task over lack of design due to the visibility granted by a BIM model. Our site teams are using the coordinated geometry to build faster and understand the impacts of site changes immediately."

"Less risk, better engineering outcomes, better standing of our firm amongst our peers."

"Smoother progress on site. Greater understanding of interface across all elements. Better client engagement. Better participation and buy-in from subcontractors when they can see the broader scope of their installation including that of other trades."

"Enthusiasm of some subs to use new tools (ie Hololens) to better their workflows."

"We are more efficient and profitable (but don't tell our Clients)."

Enabling increased use of BIM within an industry practice

Industry respondents were asked what would need to change for their company to use BIM more often. The main points raised include:

- further education for clients so they're better able to define what they need (and understand cost implications);
- improved procurement processes for BIM; and
- improved quality of BIM models and operators – using standards to help achieve this.

Further education for clients (25% of respondents mention this):

"Mandating it and ensure that clients understand what they are asking for and why."

"Clients, owners, project managers need to see the value in the process."

"Further education at Client level to provide a clearer understanding of what is required when stating you want BIM, or even coordinated output using a BIM process."

Improved procurement processes (15% of respondents mention this):

"Procurement needs to become more collaborative, teams need to be procured in an integrated fashion to truly leverage the value of shared information."

"A very basic set of rules stating model formats suitable for all prior to contracts starting."

"Greater detail in the clients' requirements for the final Asset Information Model. If this were to be realised in project BEP's at tender time, then more realistic cost allowance for data entry can be allowed. Clearer understanding would also help alleviate ambiguity and allow us to populate non-graphical data earlier."

Improved quality of BIM models and operators (23% of respondents mention this):

"We also need to educate those doing the BIM modelling that accuracy in the model is as important as the drawings they produce. We also need to somehow manage the expectations of those continually changing designs – we cannot keep up the continual changes."

"Increase quantity of BIM operators and give them more contact to the industries connected to the building life cycle. This should enable the wider industry to be able to leverage existing BIM and BIM tools."

"We need to have a cohesive strategy on how we will be using BIM in the future. An Execution Plan is but a start and the nuts and bolts of how a BIM process unfolds is critical to a beneficial implementation. We need to be training BIM capable staff as the industry isn't generating them fast enough, and in the numbers required."

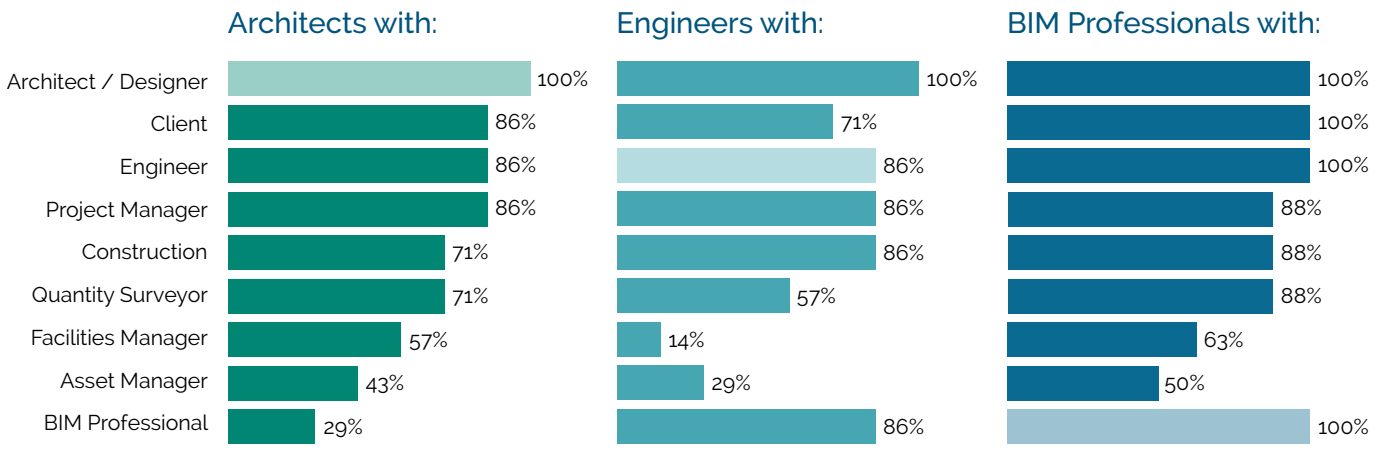
"Develop more workflows and tools for employing BIM across the reality of capture pre, during, and post construction phases."

Collaboration between industry parties using BIM

Industry comments in prior surveys indicates respondents believe collaboration between parties in the construction process is critical to increasing the acceptance and use of BIM across the industry.

In 2017, industry respondents were asked which professions they collaborate, or share information, with on projects (not BIM specific information – collaboration in general). The chart below shows the networks of collaboration. (Note the low sub-group sample size). BIM professionals have relatively high levels of collaboration across the other professions.

Industry collaboration with other parties



Base: Architects n=7, Engineers n=7, BIM professional n=8

Q. Which professions do you collaborate with or share information with on projects?

Industry participants were also asked how often they share BIM models with other professions. Over one third (36%) always share their models with other professions – a decline from 47% in 2016. A further one third (33%) are sharing often, similar to the 30% recorded in 2016. Architects are sharing BIM models most frequently, with seven in ten always sharing their models. Only 38% of BIM professional always share their BIM models.

Enabling increased sharing of models comes down to having common or shareable formats and platforms, alongside agreed standards and protocols. Lighter models and increased uptake for other parties may help.

Comments made by industry on the need for common formats and platforms include:

"NZ standards for BIM, and better knowledge of BIM."

"A live BIM environment that enables all consultants to interact and design in parallel."

"Vendor neutral format."

"One single industry standard file sharing platform as opposed to everything that is available at the moment."

"An educated audience and project defined protocols."

"Common standards for file interchange (same platform or more reliable IFC/Open source)."

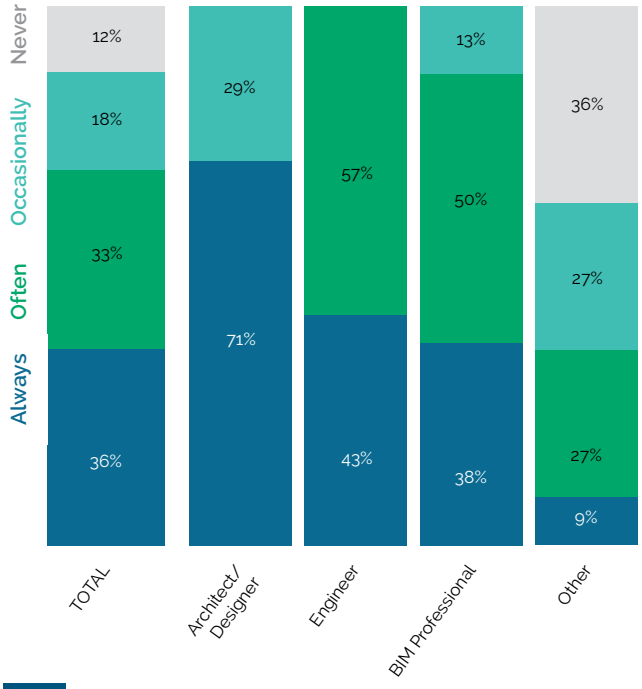
"Everyone using the same platform or at least a file format that can be used by all platforms – IFC is close but not ideal. One file sharing platform as opposed to the 100s that are out there at the moment."

"A nominated format with set rules to follow."

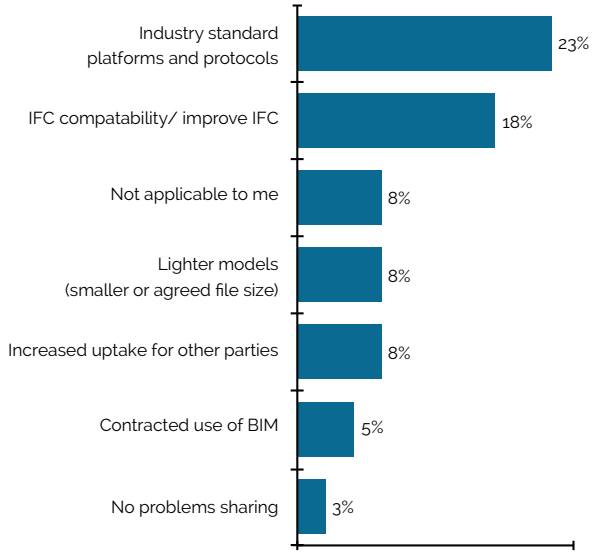
"A well defined protocol included in the BIM Execution Plan."

Industry sharing BIM Models

How often do you share BIM models with other professions?



What would make it easier to share BIM models with other professions?



Base: Total n=40, Architects n=7, Engineers n=7, BIM professional n=8, Other n=11

Q. How often do you share BIM models with other professions?

Clients benefits and challenges using BIM

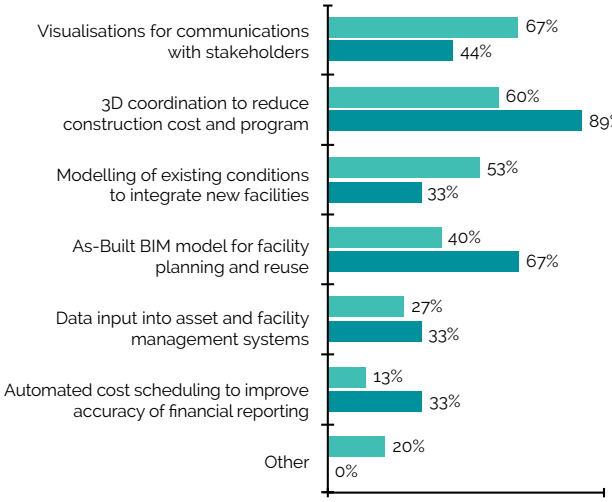
Clients were asked which BIM uses gave the most benefit, and their challenges in using BIM models.

The biggest benefit is from 3D co-ordination to reduce cost and time for a build programme. This has increased from 2016 (60% to 89% in 2017). This highlights a potential area of focus to help increase the use of BIM among clients. The proportion of clients identifying as-built BIM models for facility planning and reuse as a benefit has increased from 40% to 67% in 2017.

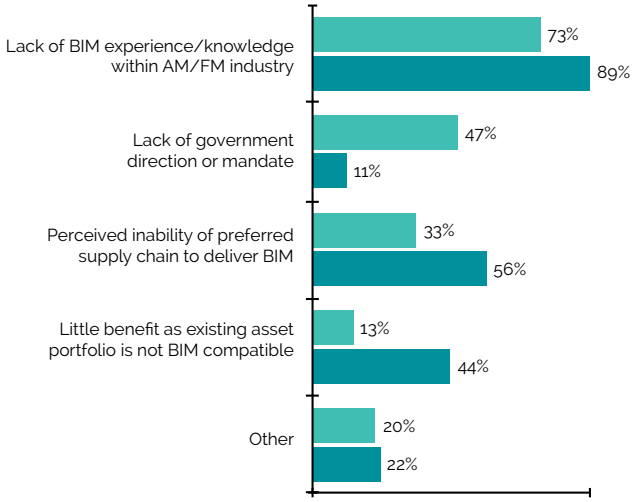
Clients reported increases in almost all of the identified challenges in 2017. A lack of BIM experience presents a major challenge. (This is similar to what industry were reporting in the first two years of the industry survey - 2014 and 2015). Clients also reported an increased challenge due to the perceived inability of the preferred supply chain to deliver BIM (from 33% in 2016 to 56% in 2017).

Clients' benefits and challenges using BIM

Biggest benefits of BIM



Challenges in using BIM models



2016 actual 2017 actual

Base: Clients using BIM now n=15

Q. What uses of BIM do you get the most benefit from?
What challenges have you experienced in using BIM models?

Barriers to BIM uptake

Industry

The 2016 survey found the obstacles to using BIM included factors such as the

- accuracy of the models,
- industry's ability to incorporate the needs of different parties,
- definition of (or compliance with) a BIM Execution Plan, and
- need for more support and understanding at a subcontractor and trade level.

In 2017 cost is a significant obstacle to increased BIM use. Several industry respondents mention the full cost of setting up, maintaining and making changes to models. In addition, there's a sense that BIM is something of a cure-all – clients ask for BIM assuming it will be everything they need, but fail to articulate their needs or fully understand what BIM can and can not do. This suggests the need for more clarity for clients on BIM and what it is able to do – from procurement through to asset management.

There is also a perceived lack of clarity among industry stakeholders around processes required for BIM to be efficient and what BIM is and is not. Several industry respondents again mentioned the industry's (in)ability to incorporate the needs of different parties or work together, and the need for more awareness and use at a subcontractor and trade level. Increased collaboration is required to incorporate the needs of all parties.

The cost involved in changes, keeping models up to date, chasing input, and the lack of desire of clients to pay for this (30% of respondents mention this):

> "Continual change by other design teams means we are burning money chasing their changes and keeping the model up to date. BIM now has this perception with our senior engineers that it costs a lot more than the old traditional 2D, and the information is less reliable."

> "Lack of BIM maturity, BIM implementation starts with great enthusiasm but as soon as the BIM administration becomes too intense and starts costing more money than anticipated it all falls apart."

> "Lack of industry experience is the biggest issue, along with clients' reluctance to forward load spending on good BIM foundations. National BIM standards would help reduce these entry costs and lubricate the BIM process in NZ."

> "The 20% savings for clients and contractors has to come from somewhere, it comes from increased work by the design consultants. The increased time and expense at the design phase, due to contractor involvement, more architectural and client driven changes that no one wants to pay for. Architect and client get to see a clearer picture of the structure interacting and the true cost of elaborate designs and then want to make changes without wanting to pay for the additional work required to change a documented design."

A lack of full awareness of the processes BIM requires in order to be efficient (30% of respondents mention this):

"Our company has mismanaged BIM on an epic scale to date. 'Relying' on BIM where the processes aren't mapped out has cost a significant amount of money with little gain."

"The greater volume of information required at earlier stages of the project are not generally recognised. Adding layers of information at late stages can have significant negative impact."

"Clients and contractors don't understand just how much information is contained in a BIM model, and how much time it takes but also how important it is to verify that data. Not many people understand, even people who are familiar with it, know how to really efficiently interrogate a BIM model, and process the resulting information."

Contractors and stakeholders not working together or taking a siloed approach (28% of respondents mention this):

"Many design professionals are still refusing to add in additional parameters to allow a full QS takeoff from a model. They note that it takes too long to do and would cost too much. Because of this we are unable to fully utilise this approach to full 5D estimation. We then have to resort to standard electronic measurement."

"Procurement is the main problem with successfully implementing BIM on projects in NZ. Projects are procured with a Capex focus, no real view or concern about Opex, and the teams are procured in a manner that sets everyone up to work in silos. Project teams focus on protecting their portion of the pie, increasing their profit margins, rather than a best for project (and client) approach."

"As the main contractor, the most obstacles or issues from outside is the different format of the information from consultants and subcontractors. For example, the architecture uses ArchiCAD, the structural engineer Revit, MEP consultant use DDS-cad, the structural steel subs use strucad, Precast wall and floor subs use AutoCAD. This makes the collaboration process very hard. From inside, it's how does the BIM manager influence the project. Actually, during the procurement, we should consider the consultants or subs' BIM capability and also use BEP to manage the work."

Lack of clarity around what BIM is and is not, and what is actually desired when "BIM" is requested as a part of a project (25% of respondents mention this):

"Misunderstanding by Clients and Project managers of what BIM is and can be."

"Disconnect between design team deliverables and construction phase deliverables – client not clear on what they actually want! Unrealistic expectations! ie "press the BIM button and it does it all for you!"

"Only a couple of obstacles, 1. in the industry there is a lack of staff with adequate training, when hiring there are a lot who say they know how to do BIM/Revit. 2. is a lack of understanding of what BIM is and isn't in the industry and who's responsibility it is for which part of the BIM process, especially when a traditional procurement option is used – the designer is expected to be doing clash detection without any sub-contractor/ contractor input."

Lack of contractor use and awareness of BIM (15% of respondents mention this):

"On fully BIM enabled Projects the next crunch point is the upskilling of the Subcontract / specialist trades sector."

"Low skill set in construction sub-trades have made implementing good handover modelling a challenge."

"A lot of services contractors, services designers and design build contractors don't use BIM authoring software and request DWG exports for their use, then they complain about on-site services/structure clashing and everybody thinks we haven't been doing coordination."

Barriers to BIM uptake

Clients

The client asset management section of this report shows that current facility and asset management systems are a barrier to further uptake of BIM. Among clients surveyed, 44% are happy with their current system and 44% are not in a position to change systems.

Those who would not consider moving to BIM say that their current systems are adequate, and these systems often incorporate a number of different products to create a custom solution.

If an increase in the use of BIM for asset and facilities management (operate stage) is desired, these existing systems must be considered. At a first stage, delivering BIM as-built models for newly built assets may help. Of clients currently using BIM, 22% always require an as-built BIM model, and a further 56% sometimes require this.

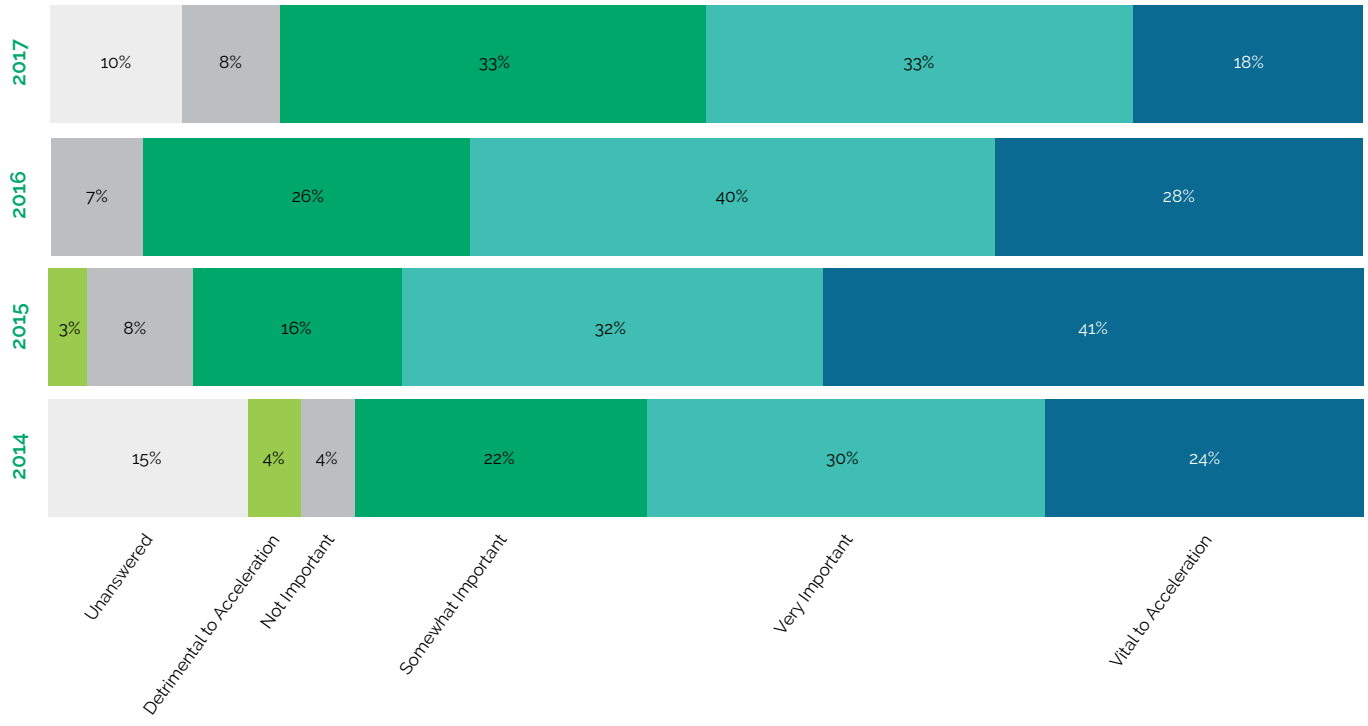
Clients who sometimes require an as-built BIM model were asked when they would or would not require an as-built BIM model.

Don't Require:	Require:	Require:
"Small projects."	"Trial project is in design phase."	"Need a conformed design model rather than a full as built. EG the design model with capture of significant changes (if any) introduced in the construction/ handover, not a construction detail model."

Industry's view on Government's role in BIM

Industry respondents were asked about the importance of government's role as a client in accelerating the development and use of BIM in New Zealand. As the chart below shows, the government's role as a client remains important, although not as important as indicated in previous years. The proportion stating that government and industry partnerships play a very important or vital role in accelerating development and use of BIM has dropped from 68% in 2016 to 51% in 2017. A consistent 8% state they thought the government's role was unimportant or detrimental to accelerating the use of BIM.

The importance of the Government's role as a client in accelerating the development and use of BIM within New Zealand



Base: All respondents 2014 n=46; 2015 n=40, 2016 n=43, 2017 n=40

Q. Do you consider Government's role as a client to be an important factor in accelerating the development and use of BIM within New Zealand?

Respondents were asked what the government should be doing to accelerate the use of BIM. The responses have focused on government's role in

- mandating the use of BIM,
- using BIM for asset and facilities management, and
- standards and training.

Previous years had a strong theme on mandating the use of BIM on all government projects. This year comments around mandating are more polarised.

"Do not think a government BIM mandate is necessary, but more active drive across all government departments to push for use of BIM (currently just isolated pilot projects, ie MOE)."

"Encourage but not mandate. Ask for the delivery value that is only obtainable by using BIM methods."

"Mandate use on their projects, with clear LOD requirement at project mile stones."

"Mandate it, but in a practical way that actually does benefit clients and projects."

It is also the role of government to lead the way as a client.

"All future construction works on government buildings should use BIM going forward."

"A roadmap to bring BIM based facilities management to all government owned buildings with operational budgets above a certain threshold should be put in place."

"The Government represents a major repeat business client within the building construction industry. If they were to lead the way on BIM implementation then the private sector would be more likely to follow suit."

The government should also be leading the way on setting standards and training.

"More BIM training for all levels. Client, contractors, PM's, QS, designers, manufacturers – all need to be on the same page and have an understanding of what each is responsible for delivering, and also how to manage others expectations."

"Adopt standard object libraries that have pre-set object parameters including the QSID parameter. This would allow all quantity surveyors to provide quick cost estimates on any project in New Zealand."

"Set standards that all parties involved must buy in to."

Control Group Organisations

Industry Control Group Organisations include:	
AECOM	Ignite Architects
Aquaheat NZ Ltd	Jasmax
Archaus	Jensen Steel Fabricators Ltd
Architectus	KTA Ltd
asBUILT	Maltbys Ltd
Assemble	MSC Consulting Group Ltd
AUT	Peddle Thorp
Barnes Beagley Doherr	RCP
Dominion Constructors Ltd	Structex
envivo	The Warehouse Limited
Fletcher Construction	University of Otago, Property Services (Design Office)
Hawkins	

Client Control Group Organisations include:	
Citycare Property	Summerset
Fulton Hogan Ltd	The Warehouse Limited
Mansons TCLM Ltd	Unitec and Wairaka Land Company (subsidiary of Unitec)
Ministry of Education	Waitemata District Health Board
NZ Transport Agency	Watercare
Precinct Properties NZ Ltd	

Some organisations in both groups wished to remain anonymous and we have not published their names in this report.

Both control groups are made up of organisations that have been identified as key users of BIM, or likely to use BIM to manage a portfolio of property or other constructed assets.

Each year, the same organisations are invited to take part in the survey, to see how BIM use and acceptance has changed over time.